Bank of Canada Banque du Canada

Working Paper 2004-17 / Document de travail 2004-17

International Cross-Listing and the Bonding Hypothesis

by

Michael R. King and Dan Segal

ISSN 1192-5434

Printed in Canada on recycled paper

Bank of Canada Working Paper 2004-17

May 2004

International Cross-Listing and the Bonding Hypothesis

by

Michael R. King[1] and Dan Segal[2]

[1]Financial Markets Department
Bank of Canada
Ottawa, Ontario, Canada K1A 0G9
mking@bankofcanada.ca

[2]Joseph L. Rotman School of Management
University of Toronto
Toronto, Ontario, Canada M5S 3E6
dsegal@rotman.utoronto.ca

The views expressed in this paper are those of the authors.
No responsibility for them should be attributed to the Bank of Canada.

Contents

Acknowledgements iv
Abstract/Résumé v

1. Introduction 1
2. Impact of Cross-Listing 4
3. The Bonding Hypothesis 6
4. Hypothesis Development 8
5. Data and Methodology 12
6. Empirical Results 19
7. Conclusion 23

Bibliography 25
Tables 29
Appendix A: Variable Definitions 40

Acknowledgements

We wish to thank Greg Bauer, Laurence Booth, Craig Doidge, Steve Foerster, Paul Halpern, Cally Jordan, Andrew Karolyi, Ole Kristian-Hope, Vikas Mehotra, Usha Mittoo, Randall Morck, Eric Santor, Larry Schembri, Tim Simin, Chris Spille of NASDAQ, three anonymous referees, seminar participants at the 2003 Canadian Economics Association, 2003 Northern Finance Association, 2004 New York Stock Exchange conference on "The Future of Global Equity Trading," University of Toronto, University of Alberta, Toronto Stock Exchange, Ontario Securities Commission, CIRANO, and the Bank of Canada for their suggestions and comments. Data for this project were made available by the NYSE and NASDAQ.

Abstract

The authors describe a new view of cross-listing that links the impact on firm valuation to the firm's ability to develop an active secondary market for its shares in the U.S. markets. Contrary to previous research, cross-listing may not provide benefits for all firms, even when those firms meet the highest regulatory requirements for disclosure and supervision. When cross-listed firms are divided into two groups on the basis of their share turnover in the home market relative to the U.S. market, the firms that develop active trading in the U.S. market experience an increase in valuation. Cross-listed firms that remain predominantly traded in the home market following cross-listing are valued similarly to non-cross-listed firms. To gain the full benefits of cross-listing, a foreign firm must convince investors that their shareholder rights will be protected. The effectiveness of this reputational bonding is witnessed in the ratio of trading on the U.S. market relative to the home market.

JEL classification: G12, G15
Bank classification: Financial markets; International topics

Résumé

Abordant la question sous un angle nouveau, les auteurs émettent l'idée que l'incidence de l'intercotation sur la valeur des actions d'une entreprise pourrait être liée à la capacité de celle-ci d'accroître le volume des transactions sur ses titres aux États-Unis. Contrairement à ce qu'ont conclu les chercheurs précédents, les sociétés ne gagneraient pas toutes à inscrire leur titre à une bourse étrangère, même lorsqu'elles satisfont aux obligations d'information et aux règles de surveillance les plus rigoureuses. Si l'on divise les entreprises intercotées en deux groupes en fonction de leurs volumes relatifs de transactions sur les marchés national et américain, on constate que celles dont le titre est activement échangé aux États-Unis sont évaluées plus favorablement. Les sociétés dont les actions continuent de se négocier surtout sur le marché d'origine après leur admission à la cote d'une bourse américaine ne sont pas évaluées différemment de celles qui sont cotées uniquement dans leur pays d'attache. Pour tirer le maximum d'avantages de l'intercotation, l'entreprise étrangère doit convaincre les investisseurs qu'elle respectera leurs droits d'actionnaires. Le volume des transactions effectuées sur le marché américain plutôt que national indique à quel point elle y est parvenue.

Classification JEL : G12, G15
Classification de la Banque : Marchés financiers; Questions internationales

1. Introduction

We examine the impact of cross-listing on the valuation of Canadian firms that list on both a Canadian and a U.S. stock exchange. Whereas earlier work on cross-listing focuses on the benefits that result from the access to foreign investors and the subsequent increased liquidity and lower cost of capital, recent work argues that a principal motivation for cross-listing is investor protection. Coffee (1999, 2002) and Stulz (1999) were the first to suggest that a foreign firm from a jurisdiction that features potentially weaker investor protection can increase its valuation by bonding itself to the U.S. securities regime through cross-listing. The bonding hypothesis suggests that firms from countries with poor protection of minority shareholders signal their desire to respect the rights of shareholders by listing in a jurisdiction with higher scrutiny, tougher regulation, and better enforcement. Better investor protection is seen as one of the factors that explain the increase in stock returns following cross-listing, because U.S. and home-country investors are more willing to invest in a foreign firm that has tied its hands in this way. Reese and Weisbach (2002), Doidge, Karolyi, and Stulz (2004), and Doidge (2004) obtain empirical results that support the bonding hypothesis. Although the bonding hypothesis applies most directly to firms from emerging markets, we examine whether bonding has an impact on the valuation of Canadian firms.

The bonding hypothesis may apply to Canadian firms for three reasons. First, previous research suggests that the level of investor protection in the United States is qualitatively higher than in Canada, either because of stricter supervision by the Securities and Exchange Commission (SEC) or the greater scrutiny by reputational intermediaries as suggested by Coffee (2002). Of the 13 cases of legal actions brought by the SEC against foreign firms between 1995 and 2002, 4 were brought against Canadian firms, whereas 36 civil cases were brought by U.S. plaintiffs against Canadian firms and their insiders from 1990 to 2002 — over 40 per cent of all the cases documented by Siegel (2004). Second, a number of studies find evidence of information leakage ahead of takeover announcements in Canada, witnessed by price run-ups or abnormal volume in the target firm's shares prior to the event (Jabbour, Jalilvand, and Switzer 2000; Eckbo and Thorburn 2000; Bris 2003). This pattern suggests that certain investors systematically have access to information before it is made public and are able to trade on it. This information asymmetry may lead minority shareholders to perceive that their shareholder rights are not well protected. Third, research on concentrated ownership argues that the valuation of firms with controlling shareholders is lower relative to widely held firms, because minority shareholders may be less well protected (La Porta et al. 2000, 2002; Morck 2000). Unlike the United States, where

widely dispersed ownership is the norm, Canada has more concentrated corporate ownership with more large firms controlled by wealthy families, more frequent use of pyramidal ownership structures, and more prevalent use of multiple classes of voting shares (Attig, Gadhoum, and Lang 2002; Morck, Stangeland, and Yeung 2000). In this environment, theory predicts that minority shareholders will be at a disadvantage. For these reasons, bonding may have an impact on the valuation of cross-listed Canadian firms over and above the documented effects related to higher returns, greater investor recognition, and a lower cost of equity. We examine this hypothesis.

A comparison of Canadian and U.S. firms provides a unique experiment of this bonding hypothesis. Canadian firms make up the single largest group of foreign firms listed on U.S. stock exchanges, with more than 180 Canadian firms cross-listed in 2003. In addition, most studies of cross-listing focus on foreign firms that issue American Depositary Receipts (ADRs), with an emphasis on those ADRs subject to the highest regulatory requirements. Canadian firms, however, are required to cross-list using an ordinary share that is no different from the shares issued by U.S. firms.[1] These Canadian firms must meet all the same filing and disclosure requirements as a U.S. firm, and are subject to supervision, and enforcement by the SEC. The U.S.-listed shares of Canadian firms are denominated in U.S. dollars, and are fully fungible with the home shares listed on the Toronto Stock Exchange (TSX), denominated in Canadian dollars. These two shares trade seamlessly across markets, with prices adjusting to eliminate arbitrage opportunities that result from movements in exchange rates (Gagnon and Karolyi 2003). Moreover, Eun and Sabherwal (2003) show that price discovery for these cross-listed shares occur in both markets. Given these facts, the shares of Canadian firms should be expected to be close substitutes in the portfolios of U.S. investors.

This paper makes three important contributions to the cross-listing literature. First, most studies of cross-listing look only at cross-listed firms.[2] We examine both cross-listed and non-cross-listed firms to mitigate selection bias in the definition of the sample. Two groups of non-cross-listed firms are considered: Canadian firms that are listed exclusively in Canada, and U.S. firms. The non-cross-listed Canadian firms provide a partial counterfactual case, because they include many large firms that could potentially be cross-listed but are not. The cross-listed firms, therefore, can be viewed as a treatment group, and the non-cross-listed Canadian firms the control group. The U.S.

---

[1] The exceptions are Canadian shares that are unregistered and trade over the counter on the National Quotation Bureau's "pink sheets." Reese and Weisbach (2002) report 284 such issues between 1985 and 1999.

[2] Reese and Weisbach (2002) and Doidge, Karolyi, and Stulz (2004) are notable exceptions.

sample acts as a benchmark for comparing both groups of Canadian firms. Second, most studies of cross-listing adopt an event-study approach to examine the impact on stock returns, employing short windows of up to twelve months before and after the date of cross-listing.[3] We examine the longer-term impact on valuation, using twelve years of data from 1990 to 2001 to capture steady-state relationships. Third, we examine relative valuation rather than absolute returns, similar to Sundaram and Logue (1996). By comparing firms using multiples of book value and earnings, we provide a standardized metric that controls for differences in exchange rates and discount rates. By using a different dependent variable than other studies, we provide a robustness check for other research on the impact of cross-listing.

We describe two main findings. First, cross-listing has a positive impact on valuation over and above the positive impacts associated with firm size, profitability, cost of equity, and past sales growth. This result is consistent with the findings in the cross-listing literature, although the time horizon in this study is much longer than before. This positive impact is most evident when comparing the cross-listed and non-cross-listed Canadian firms. The cross-listed firms that are subject to stricter SEC supervision and greater scrutiny by U.S. investors are valued more highly than Canadian firms that are listed exclusively on the TSX. This finding is consistent with the predictions of the bonding hypothesis. Second, the location of share trading is linked to valuation. Cross-listed firms that are traded actively in the U.S. market experience a significant increase of valuation over the long term. Cross-listed Canadian firms that fail to develop active share turnover in the United States and remain traded predominantly in Canada are valued no differently from non-cross-listed Canadian firms. Greater share turnover on the U.S. stock markets may be viewed as a proxy for reputational bonding, consistent with Siegel (2004). U.S. investors may differentiate between those Canadian firms that respect the rights of U.S. investors and those that do not. Trading is then concentrated in the former, with investors making subsequent judgments on the firm's attractiveness as a second step in the investment process. Effective bonding may therefore be a pre-condition for generating greater share turnover following cross-listing. This hypothesis needs to be explored further in research that examines the characteristics of Canadian firms that are predominantly traded in the United States. Important characteristics to consider are firm ownership structure, the geographic location of a firm's sales, and a firm's history of capital raising in the United States.

---

[3] Mittoo (2003) looks at returns for up to three years following the date of cross-listing.

This paper is organized as follows. Section 2 reviews key findings from the cross-listing literature and motivates the choice of explanatory variables used in the analysis that follows. These variables will be used to control for the known impact of cross-listing on a firm's valuation in order to identify the impact of bonding. Section 3 outlines the bonding hypothesis and explains why the level of investor protection in Canada may be perceived to be lower than in the United States. Section 4 develops the hypotheses that are examined in this paper. Section 5 describes the data and the methodology for testing these hypotheses. Section 6 presents empirical results. Section 7 concludes.

2. Impact of Cross-Listing

By the mid-1990s, foreign firms from more than 40 countries had shares cross-listed on U.S. exchanges (Karolyi 1998). The majority of those shares trade in the form of ADRs, with the focus of most research on Level II and Level III ADRs that have the highest disclosure and filing requirements.[4] As an alternative to an ADR, foreign firms from a subset of countries such as Canada, Israel, Hong Kong, and the Netherlands have the choice of listing on a U.S. exchange as an ordinary share. While Canadian firms are not required to list as an ordinary share, almost all Canadian firms prefer this format.[5] When listing as an ordinary share, Canadian firms meet all the same requirements as U.S. firms: they file annual financial statements that present results according to U.S. generally accepted accounting principles (GAAP), meet continuous disclosure requirements, and satisfy other regulatory requirements imposed by the SEC. Similar to the case with U.S. firms, U.S investors have the right to sue these Canadian firms under provisions such as Rule 10b-5 (Coffee 1999). These regulatory requirements, the associated costs, and the risk of a lawsuit may be a significant deterrent to cross-listing (Reese and Weisbach 2002).

Although Canadian firms that cross-list in the United States are required to list as ordinary shares, this process has been facilitated since 1991 by the Multi Jurisdictional Disclosure System (MJDS). Under the MJDS, a Canadian issuer with a public float of US$75 million (excluding control stakes of 10 per cent or more), a one-year history as a reporting issuer in Canada, and a record of compliance with Canadian reporting requirements is permitted to file its Canadian prospectus to

---

[4] ADRs have different levels of disclosure required for different ADR classes. Foreign firms that pursue a Level II ADR where no capital is raised, or a Level III ADR where new capital is raised, must file annual financial statements on Form 20-F, and a registration statement on Form F-6, as well as reconcile their accounts either partially or fully to meet U.S. GAAP (Coffee 1999; Karolyi 1998; Miller 1999).

[5] While no Canadian firms currently have ADRs, a few cases have occurred in the past. We wish to thank Cally Jordan for clarifying this point.

satisfy SEC registration requirements, accompanied by the relevant "wrap-around" form, depending on the type of security issued. Public offerings of equity securities for cash are accompanied by Form F-10, which includes financial statements that are reconciled to U.S. GAAP in accordance with Form 20-F. Continuous reporting requirements under the Exchange Act can be met by filing home jurisdiction documents with the SEC. If these requirements are met, MJDS offerings are given "no-review" status by the SEC and the offering is subject to review by only the Canadian regulatory authorities. Not surprisingly, the MJDS has encouraged many Canadian firms to cross-list; the number of Canadian firms cross-listing on U.S. stock exchanges in the 1990s has increased, despite the greater integration of these two markets (Mittoo 2003). As a result, Canada has the highest number of cross-listed firms in the United States of any foreign country when considering ordinary listings, and Level II and Level III ADRs (Reese and Weisbach 2002).[6]

Studies of cross-listing have documented a number of benefits from this activity that stem from two main effects: the reduction in a firm's idiosyncratic risk as it overcomes market segmentation and becomes part of the global portfolio and the increase in liquidity due to the improved information environment following cross-listing (Foerster and Karolyi 1999; Karolyi 1998). These effects are difficult to disentangle.

The first effect explains the increased returns following cross-listing. International capital markets remain segmented to a greater or lesser degree despite globalization, leading stocks to be priced as part of the domestic portfolio. When firms cross-list, their correlation — or beta — with the home market declines as their beta with the global market increases, leading to a reduction in the riskiness of the firm's shares when held in a diversified portfolio (Errunza and Losq 1985; Errunza and Miller 2000; Foerster and Karolyi 1999; Karolyi 1998; Karolyi and Stulz 2002; Miller 1999; Stulz 1995, 1999). This reduction in idiosyncratic risk leads to a lower cost of equity and higher returns. Cross-listed firms generally exhibit abnormal returns in the run-up to cross-listing and shortly after the event, but decline in the year following cross-listing as the built-in risk premium that compensated for market segmentation dissipates (Foerster and Karolyi 1999; Miller 1999). Mittoo (2003) presents a cautionary note. She finds that the positive price and liquidity effects have declined over time, and that cross-listed Canadian firms in her sample underperform over the three years following cross-listing.

---

[6] This result is not surprising, given the geographic proximity, trade links, and cultural similarities between the two countries. For more on this explanation, see Sarkissian and Schill (2003).

The second effect of cross-listing is a reduction in information asymmetry for these firms. Secondary market liquidity increases following cross-listing in both the home and the foreign market, accompanied by a reduction in trading costs and a narrowing of bid-ask spreads in the home market (Bancel and Mittoo 2001; Chan, Fong, and Stulz 1994; Domowitz, Glen, and Madhavan 1998; Doukas and Switzer 2000; Foerster and Karolyi 1998; Mittoo 1992, 2003; Pagano, Roell, and Zechner 2001). Greater liquidity is associated with increased visibility, greater analyst coverage, improved earnings forecasts, and better investor recognition (Bailey, Karolyi, and Salva 2002; Baker, Nofsinger, and Weaver 2002; Bancel and Mittoo 2001; Foerster and Karolyi 1999; Lang, Lins, and Miller 2003; Leuz 2002; Smith and Sofianos 1997). Blass and Yafeh (2001) argue that this channel is particularly important for younger firms or firms in specific industries such as high-technology. The better information environment is associated with the increased returns and the higher valuation of the cross-listed firm, consistent with Merton's (1987) investor recognition hypothesis.

These studies suggest that any examination of cross-listing must explain the higher returns while taking into account the reduction in the cost of equity, increased liquidity, and firm-specific characteristics such as firm size and industry membership.

3. The Bonding Hypothesis

What is the bonding hypothesis? Coffee (2002) notes that bonding was used originally in law and economics to refer to the costs or liabilities that an agent or entrepreneur will incur to assure investors that it will perform as promised, thereby enabling it to market its securities at a higher price. This concept is used to explain the growth in cross-listings on U.S. exchanges over other jurisdictions in separate papers published by Coffee (1999) and Stulz (1999). Coffee (2002) uses bonding to refer to a mechanism by which firms incorporated in a jurisdiction with weak protection of minority rights or poor enforcement mechanisms can voluntarily subject themselves to higher disclosure standards and stricter enforcement in order to attract investors who would otherwise be reluctant to invest (or who would discount such stocks to reflect the risk of minority expropriation). This bonding may occur either through the courts or through monitoring by reputational intermediaries such as U.S. underwriters, auditors, credit rating agencies, equity analysts, and

stock exchanges. Coffee terms the first channel *legal* or liability-based bonding, and the second channel *reputational* bonding.[7]

A number of empirical studies have tested the bonding hypothesis, either directly or indirectly (Doidge 2004; Doidge, Karolyi, and Stulz 2004; Dyck and Zingales 2004; Miller 1999; Reese and Weisbach 2002; Siegel 2004; Tribukait 2002).[8] Because regulatory bonding is a phenomenon that is not directly observable, these authors have designed tests that attempt to capture this effect using proxies. In an early study that does not focus on bonding directly, Miller (1999) examines ADRs and finds that the benefits of cross-listing are evident only for ADRs that are subject to the highest levels of disclosure and regulatory supervision. Reese and Weisbach (2002) proxy for bonding using the frequency and location of equity offerings that follow cross-listing. Equity issues increase following all cross-listings, but the increase is larger for firms that are from jurisdictions with weak investor protection, and those firms raise more equity in the firm's home country than in the United States. Nenova (2003), Dyck and Zingales (2004), and Doidge (2004) examine the private benefits that accrue to majority shareholders, proxied by the premium on changes in controlling blocks of shares, or the difference in valuation between voting and non-voting shares for firms with multiple classes of shares. Doidge (2004) finds, for example, that the premium between voting and non-voting shares declines following cross-listing, an indication that minority investors are better protected and benefit more from cross-listing.

Recent research has raised two important modifications to the bonding hypothesis. First, bonding may occur through the operation of the financial markets and not the courts. Siegel (2004) studies Mexican firms with ADRs traded on U.S. exchanges and finds that U.S. law enforcement neither deterred nor punished Mexican insiders who expropriated assets from those companies. Further, using the sample of all legal actions by the SEC against foreign firms from 1995 to 2003, Siegel finds that the courts have been mostly ineffective in punishing the foreign firms. He finds, instead, that investors punish Mexican firms by reducing their access to capital. Siegel concludes that bonding works through a reputational mechanism and not through the courts.

Second, regulatory bonding is costly, because it restricts the ability of controlling shareholders to expropriate rents from the firm (Doidge, Karolyi, and Stulz 2004; Reese and Weisbach 2002).

---

[7] Although Stulz (1999, 25) does not use the term bonding, he makes a similar case, stating: "To the extent that the local exchange may not have such high standards, globalization enables firms to seek listings on foreign exchanges which have high standards, thereby increasing firm value by insuring that the firm's policies are more likely to increase shareholder wealth and by making it easier for the firm to raise funds."

[8] Benos and Weisbach (2003) summarize a number of these studies.

Firms may therefore self-select and not cross-list, despite the benefits documented in the literature. Doidge, Karolyi, and Stulz (2004) point out that fewer than one in ten large public companies from outside the United States choose to cross-list their shares on U.S. stock markets. In Canada, for example, 10 out of the top 35 companies that make up the TSE35 index were not cross-listed in 2003. Using a cost-benefit framework, Doidge, Karolyi, and Stulz show that firms have an incentive to cross-list when controlling shareholders stand to benefit from valuable growth opportunities that cannot be financed domestically. They find that cross-listed firms are valued at a premium to non-cross-listed firms when controlling for future growth opportunities, and this difference is greatest for firms that are from jurisdictions with weak investor protection.

The literature on the bonding hypothesis does not say anything directly about the home-bias phenomenon.[9] Home bias refers to the unwillingness of investors to diversify their portfolios internationally, making the proportion of foreign assets held by domestic investors too small relative to the predictions of modern portfolio theory. There is a large literature on this topic, but few studies that consider the impact of cross-listing on home bias. Given the positive impacts of cross-listing, it is unclear what the relative valuation should be when cross-listed firms are compared with U.S. firms. The literature on home bias suggests that foreign firms are valued at a discount to U.S. firms as a result of information asymmetries, geography, or other factors (Ahearne, Griever, and Warnock 2001; Coval and Moskowitz 1999; Hasan and Simaan 2000; Huberman 2001; Portes, Rey, and Oh 2001). Dahlquist et al. (2002) suggest that concerns about ownership structure may be the cause of home bias, providing a link with the bonding literature. We do not address this issue directly, although the analysis below does present some interesting results.

4. Hypothesis Development

The bonding hypothesis has been debated largely in terms of its benefit for firms from countries where investor protection is weak, particularly for firms from emerging markets. We argue, however, that there may be benefits to cross-listing for Canadian firms if investor protection in the United States is perceived to be higher than in Canada.

Most observers would start from the assumption that Canada offers the same high level of investor protection as the United States. The legal indices of shareholder and creditor rights created by La

---

[9] Lewis (1999) provides a comprehensive review of both equity home bias in the finance literature, and consumption home bias in the macroeconomics literature.

Porta et al. (1998) would appear to support this hypothesis. Table 1 shows that Canada and the United States have similar ratings on the basis of La Porta et al.'s indices, particularly in categories such as oppressed minorities mechanism, antidirector rights, the efficiency of the judicial system, the rule of law, and the risk of expropriation. The main difference in the table concerns ownership concentration for the ten largest non-financial firms, where Canada has a higher concentration. On the basis of this comparison, shareholder rights in Canada appear to be as well protected as in the United States. Comparisons of accounting standards across countries, and the minimum listing standards on the major stock exchanges, lead to a similar picture.

A different picture emerges from other indicators of investor protection. A number of studies question the enforcement of securities regulation in Canada, particularly in the area of insider trading. Bhattacharya and Daouk (2002) observe that insider trading laws were established in Canada much later than in the United States, with the first prosecution under Canadian laws coming in 1976, fifteen years after the first prosecution in the United States. In a cross-country study of 52 countries, Bris (2003) finds that the amount of profits realized by insiders ahead of the announcement of a takeover is higher in Canada than in almost every other country in the sample. Using data on Canadian acquisitions, Jabbour, Jalilvand, and Switzer (2000) and Eckbo and Thorburn (2000) document a run-up in the shares of Canadian firms prior to the announcement of an acquisition, which they ascribe to trading by informed corporate insiders. McNally and Smith (2003) find large-scale evidence of insider trading and reporting violations, based on a study of stock buyback programs and insider trading around significant news announcements.

The poor record of enforcement in this area led the Canadian government to introduce legislation in June 2003 designed to bring white-collar crime under the Criminal Code, while increasing penalties and setting up special police teams to pursue investigations in this area. A report published in November 2003 by a working group of Canadian securities regulators and supervisors (Insider Trading Task Force 2003) acknowledges the severity of the problem, noting a number of key differences relative to the United States, such as a lack of specific requirements on containing insider information for lawyers, accountants, and banks in Canada. Not surprisingly, Canadian firms are disproportionately represented in the cases of legal actions brought by the SEC against foreign firms discussed in Siegel (2004), representing 4 out of the 13 cases. In terms of civil cases brought by U.S. plaintiffs against foreign firms, Canada's record is worse, representing 36 out of 87 cases, or 42 per cent of cases from 1990 to mid-2002 (Siegel 2004). Although part of this record may be explained by the close proximity of Canada and the United

States and the large number of cross-listed Canadian firms, the figures suggest that corporate practices that go unpunished in Canada are prosecuted in the United States.[10]

There are also important differences in the structure and concentration of ownership of firms between Canada and the United States. Concentrated corporate ownership is associated with lower firm valuations, because minority shareholders may be less well protected (La Porta et al. 2000, 2002; Morck 2000). Morck, Stangeland, and Yeung (2000) and Attig, Gadhoum, and Lang (2002) find that Canada has higher levels of corporate ownership by wealthy families, more frequent use of pyramidal ownership structures, and more prevalent use of multiple classes of voting shares than the United States. Table 2 reports the ownership data collected by Attig, Gadhoum, and Lang (2002) for 1,093 publicly traded Canadian firms. Over 55 per cent of firms are family owned when control is based on a 10 per cent ownership threshold, with this number declining to 41 per cent using a 20 per cent ownership threshold. Only 19 per cent of Canadian firms are widely held at the 10 per cent threshold, and 37 per cent of firms at the 20 per cent threshold. More than 1 in 6 Canadian firms uses multiple classes of shares, while almost 7 per cent have non-voting, ordinary shares. These statistics are in sharp contrast to the United States, where widely dispersed ownership is the norm and discriminatory voting rights is the exception (Morck 2000).

Taken together, these differences in enforcement and ownership structure between Canada and the United States suggest that investor protection for minority shareholders may be weaker in Canada than in the United States. If this proves to be the case, then Canadian firms should have a lower valuation than their U.S. peers. Below, we put forward three hypotheses.

Hypothesis 1: Canadian firms listed exclusively in the home market are valued at a discount to U.S. firms, after controlling for firm-specific characteristics.

If investor protection is higher in the United States than in Canada, the bonding hypothesis predicts that Canadian firms may benefit by cross-listing if this action leads shareholders to believe they will be better protected. Even if the U.S. courts do not appear to be successful in protecting the rights of U.S. investors, as Siegel (2004) suggests, the signal from cross-listing and the greater scrutiny by "reputational intermediaries" as suggested by Coffee (2002) may lead to an increase in the valuation of Canadian firms that signal their quality in this way. In other words,

---

[10] McNally and Smith (2003) provide a record of all insider trading prosecutions by Canadian securities commissions from 1980 to 2002, and report only 25 cases and 15 prosecutions.

bonding may have an impact on the valuation of cross-listed Canadian firms over and above the documented effects related to higher returns, greater liquidity, and a lower cost of equity.

Hypothesis 2: Cross-listed Canadian firms are valued at a premium to exclusively Canadian-listed firms, after controlling for firm size, profitability, industry membership, and future growth prospects.

This hypothesis is straightforward to test, but interpretation of the results is not. A finding that cross-listed firms are valued more highly after controlling for these factors may be consistent with the bonding hypothesis, but it is insufficient for proving that the higher marginal valuation results from reputational bonding. As Coffee (2002) points out, the difficulty in testing for the impact of bonding is to control for other factors that may explain the increased valuation, such as higher sales in the United States or enhanced analyst coverage. If bonding is a latent and unobservable effect, researchers must try to identify either an instrument or a proxy variable that can be used to capture this effect (Wooldridge 2002).

We suggest a proxy for bonding that is based on share turnover in the U.S. market. Siegel (2004) notes that bonding occurs through a reputational mechanism, not through the courts. In the case of the Mexican companies in his study, access to new capital — both in Mexico and the United States — was restricted after the asset-taking became public. Other Mexican firms that did not engage in any form of expropriation, however, were more likely to receive outside resources, leading Siegel to conclude that the market punished firms much more harshly than did the SEC.

We argue that U.S. investors differentiate between cross-listed companies on the basis of their reputation for respecting the rights of shareholders. Siegel's finding for Mexican ADRs should be applicable to all cross-listed firms where the treatment of minority shareholders is a concern. Although the Mexican case is quite extreme, because the scale of expropriation was large and the country underwent a financial shock with the 1994 Peso crisis, investors may still differentiate between cross-listed firms on the basis of their reputation for respecting investors' rights. In the case of cross-listed Canadian firms, the implication is that Canadian firms that treat minority shareholders unfairly — or are suspected of having done so — would find their access to capital restricted.

We argue that, in the absence of a shock that can be used to test the hypothesis put forward by Siegel (2004), an alternative proxy of bonding is to examine at the secondary trading of cross-listed firms. A stylized fact in the cross-listing literature is that cross-listing leads to an increase in liquidity because of a pickup in trading volumes in both the home and the foreign stock market. If

this increase in trading volumes is absent, then firms that incur the costs required to cross-list may not experience the benefits of a lower cost of equity and higher returns. In this case, a failure to generate significant share turnover in the U.S. market would indicate a failure to bond, suggesting that U.S. investors do not believe that their minority rights will be respected by this firm.

Hypothesis 3: Cross-listed firms that bond to the U.S. markets will exhibit higher share turnover on the U.S. stock exchange and higher valuations than other cross-listed firms that do not bond.

Although share turnover on U.S. exchanges is undoubtedly a noisy measure that captures a number of different effects, we argue that secondary trading in the U.S. market is conditional on investors believing they will be fairly treated as minority shareholders. Bonding can be viewed as an a priori condition for U.S. shareholders to invest in a cross-listed firm. As Siegel (2004) shows, U.S. investors do not initially know the firm's type, but learn over time whether the firm's owners and managers can be trusted. The three hypotheses proposed in this section will be examined in section 6.

5. Data and Methodology

We use annual company accounts data and monthly price data for both U.S. and Canadian firms from Standard & Poor's Compustat for the 12-year period from 1990 to 2001. Monthly betas and prices for U.S.-listed securities are collected from the Center for Research in Stock Prices (CRSP) database, and for Canadian-listed securities from the TSX-Canadian Financial Markets Research Center (TSX-CFMRC) database. Canadian firms that are cross-listed on a U.S. stock exchange are identified using data from the NYSE, the NASDAQ, and year-end editions of the *TSE Review*. Observations dropped from the sample are all firm-year observations with negative assets, negative book value of equity, or negative sales. Foreign firms listed in the United States from countries other than Canada are dropped from the sample. The remaining sample of U.S. and Canadian firms is then restricted to those industries that are present in both countries, based on the three-digit Standard Industrial Classification code. This restriction ensures that the valuation of industries not present in both samples does not bias the results. Note that the final sample includes firms with different fiscal year-ends. Compustat treats financial results reported for fiscal years ending in January through June as having occurred in the previous calendar year. For example, the financial results for a firm with a fiscal year-end of June 2001 are classified as belonging to calendar year 2000. All per-share statistics are adjusted for stock splits, stock dividends, and similar events.

Table 3 provides descriptive statistics on the three categories of firms in the sample. Panel A shows that the final sample consists of 6,761 U.S. firms, 717 Canadian firms listed exclusively on the TSX, and 206 cross-listed Canadian firms. Although the data cover twelve years, the median firm in each sample is observed between three and five years. For this reason, there are 37,758 firm-year observations for U.S. firms, 3,367 observations for Canadian firms, and 974 observations for cross-listed firms. For this reason, we use econometric techniques that are robust to unbalanced panels. Panel B provides statistics on the market value of firms in each sample, measured in U.S. dollars at year-end exchange rates. The cross-listed Canadian firms are larger on average than either the non-cross-listed Canadian or U.S. firms, with more positive skewness than the other two samples. Note that the mean and median Canadian firms listed only on the TSX are significantly smaller than the U.S. firms. Panel C shows that the Canadian firms are more frequently sampled in the latter half of the 1990s, a factor that needs to be accounted for in the analysis that follows. Panel D shows the distribution of all samples across five industry groupings. The U.S. sample has a concentration in manufacturing and service firms (41 per cent), high-technology (24 per cent), and financial services (23 per cent). The Canadian sample has similar weighting in manufacturing and services (40 per cent), but a greater percentage in natural resources (23 per cent). The cross-listed sample has lower manufacturing and services (34 per cent), more natural resources (33 per cent), and more high-technology firms (21 per cent) than the non-cross-listed Canadian firms. Our regressions control for industry membership directly. These results are also robust when high-technology firms, or only Nortel Networks, are dropped.

The impact of cross-listing on valuation is tested through a series of regressions, where the dependent variable is a measure of the valuation of a firm's equity. The use of valuation ratios instead of returns as the key dependent variable is similar to Sundaram and Logue (1996). Valuation ratios provide a means of comparing firms across borders using a standardized metric, while avoiding the problems associated with currency risk. The ratio of book-to-market (BM) is used in one specification and the ratio of last-twelve-months earnings-to-price (EP) is used in a second specification.[11] Although the use of a forward-looking measure of earnings would be preferred in this setting, data on the earnings expectations for Canadian firms are not available for a large enough sample of firms, nor is a sufficiently long history available for the subset of

---

[11] These regressions are also run using Tobin's q, free cash flow-to-enterprise value, and earnings before interest, taxes, and depreciation-to-enterprise value, which generate similar results. The results are not shown, but are available upon request.

Canadian firms covered by I/B/E/S. Following the convention in the literature, the book-to-market and earnings-to-price are calculated using the price three months after fiscal year-end to allow for the publication of the financial results.[12] Table 4 provides descriptive statistics on the dependent and independent variables for each sample.

Given that we use earnings-to-price as one of the valuation measures, we are careful to check the relative incidence of negative earnings before extraordinary items across Canadian and U.S. firms in our sample. Panel E of Table 3 shows the distribution of losses by sample, where losses are based on net income before extraordinary items. Over the entire period, 19 per cent of U.S. firms in this sample had losses, compared with 21 per cent for the Canadian firms listed on the TSX, and 32 per cent for the cross-listed firms. The higher incidence of losses among cross-listed firms is surprising, and may lead to an upward bias in the comparisons based on earnings-to-price. The regressions on book-to-market are more robust to firms with losses, because book value is a stock measure of cumulative retained earnings and therefore less volatile than annual earnings. For this reason, we view the results of the regressions on book-to-market as more informative.

The regressions attempt to capture the impact of bonding on valuation by controlling for those effects associated with cross-listing that lead to an increase in valuation. The control variables consist of company-specific variables, and dummy variables that identify a firm's country of origin (*CTRY*) and whether it is cross-listed (*CROSS*). A similar dummy-variable approach is used by Nenova (2003), Doidge, Karolyi, and Stulz (2004), and Dyck and Zingales (2004). Although this method is imperfect, it tries to capture systematic effects on valuation related to country of origin and cross-listing that remain after controlling for the known effects of cross-listing.

The control variables used in the regressions are as follows. Firm-specific variables are calculated for each year for firm size, profitability, cost of equity, future growth opportunities, and share turnover. Firm size (*SIZE*) is measured by the natural log of total assets, denominated in U.S. dollars. Canadian-dollar assets are converted using the exchange rate at the end of the firm's fiscal year. Profitability is measured using return on equity (*ROE*). To test the robustness of this measure, ROE is decomposed into profit margin (*PMARG*), asset turnover (*ATURN*), and financial leverage (*FLEV*), following the Dupont method.

---

[12] The results reported below are robust when other prices are used, such as fiscal year-end and one and two months after year-end.

The cost of equity (*K*) is computed using the single-factor Capital Asset Pricing Model (CAPM). Although the CAPM has its critics, it is widely used in finance, particularly by practitioners (Graham and Harvey 2001).[13] The nominal annualized yield on the 90-day treasury bill in each market is used to proxy for the risk-free rate. Company betas are taken from the CRSP and TSX-CFMRC databases and are calculated based on five years of monthly observations using a rolling window.[14] Canadian betas are relative to the Toronto Stock Exchange 300 (TSE300) composite index, and U.S. betas are based on the Standard & Poor's 500 (S&P500) index.[15] The cost of equity for cross-listed firms is based on two betas, namely their correlation with both the TSE300 and the S&P500. The equity premium for Canada and the United States is taken from Claus and Thomas (2001), who estimate the equity-market premium over the period 1985 to 1998 for Canada at 2.23 per cent and for the United States at 3.40 per cent.[16] Similar to the case of ROE, the robustness of the cost of equity is checked by decomposing it into two components: the risk-free rate (*TBILL*) and the firm-specific equity premium (*PREM*).

Following Doidge, Karolyi, and Stulz (2004), a firm's future growth opportunities are proxied using sales growth over the past two years (*SALES*). For example, sales data from 1988 and 1989 are used to calculate the average sales growth in 1990. When three years of sales data are not available, we use sales growth over two years. We include a dummy variable to control for firms that have negative earnings before extraordinary items (*LOSS*). This dummy variable takes on a value of 1 in a year when a firm has losses, and zero otherwise. We include dummy variables for five industries based on the North American Industry Classification System (NAICS) code.[17] In these regressions, the reference industry is firms engaged in manufacturing, wholesale or retail trade, and services. The other four categories are: financial services and real estate, high-tech, transportation and utilities, and natural resources (including mining, oil and gas, and forestry). Panel D of Table 3 provides details on the NAICS codes used to identify industries. We include a full set of year dummies (*YEAR*) in each regression to control for time-specific effects. Although

---

[13] The three-factor model developed by Fama and French (1992) is one alternative among many, but it would not be suitable in this context, given that book-to-market is one of our two dependent variables.

[14] A small number of firms in our sample did not have a beta in either of these sources. For these firms, we calculated the median unlevered beta for each industry based on the first two-digits of the Standard Industrial Classification (SIC) code, then re-levered this industry beta for each firm.

[15] The TSE300 composite index was replaced with the S&P/TSX composite index on 1 May 2002. Our study covers an earlier period, so the TSE300 index is used.

[16] These results are robust to the assumption that Canada and the United States have the same equity premium, as well as the assumption that Canada has a higher equity premium than the United States (following Damodoran 2002). The results are qualitatively the same under all three cases.

[17] NAICS are used instead of SIC codes because the new system distinguishes better among high-technology firms.

panel regressions capture variation across time for individual firms, the time dummies capture systematic effects affecting all firms. In these regressions, the reference year is 1990, although the results are robust to the use of other reference years. Owing to a lack of ownership data, we do not control for the ownership structure of these firms. Details on the formulae used to calculate all the variables in the regressions are provided in Appendix A.

The relationship between the three samples of firms can be tested simultaneously by considering a panel regression with two dummy variables. One dummy variable specifies the nationality of the firm, with *CTRY*=1 for Canadian firms. A second dummy variable captures the effect of being cross-listed, with *CROSS*=1 for cross-listed firms. The net effect on valuation of being a cross-listed firm relative to U.S. firms is therefore the sum of the two dummy variables, *CTRY* and *CROSS*. There may be an issue of self-selection in these samples, because the cross-listed firms are expected to be large and profitable firms that compete globally in their industry. Recall, however, that 10 out of the top 35 Canadian firms are not cross-listed, although they could potentially benefit from cross-listing. These samples therefore compare firms that received a treatment of cross-listing, as well as a control group of firms that qualified for the treatment but opted out. We estimate two models:

$$BM_{it} = a + \beta_1 SIZE_{it} + \beta_2 ROE_{it} + \beta_3 K_{it} + \beta_4 SALES_{it} + \beta_5 LOSS_{it} + \beta_6 CROSS_{it} + \beta_7 CTRY_i + \beta_n NAICS_{it} + \beta_k YEAR_t + e_{it}, \quad (1)$$

$$EP_{it} = a + \beta_1 SIZE_{it} + \beta_2 ROE_{it} + \beta_3 K_{it} + \beta_4 SALES_{it} + \beta_5 LOSS_{it} + \beta_6 CROSS_{it} + \beta_7 CTRY_i + \beta_n NAICS_{it} + \beta_k YEAR_t + e_{it}, \quad (2)$$

where book-to-market (*BM*) is the dependent variable in one specification and earnings-to-price (*EP*) in a second. The control variables in both regressions are the log of total assets in U.S. dollars (*SIZE*), return on equity (*ROE*), cost of equity (*K*), past sales growth (*SALES*), a dummy variable when the firm has negative earnings before extraordinary items (*LOSS*), and a dummy variable for each of four industries (*NAICS*) where the reference industry is firms in manufacturing, trade, and services. *CROSS* is a dummy variable set equal to 1 for cross-listed firms and set to 0 otherwise. *CTRY* is a dummy variable set equal to 1 for Canadian-listed firms and set to 0 otherwise. *YEAR* represents dummy variables for each year, with 1990 as the reference year. We checked the robustness for ROE and cost of equity. In each regression we replaced ROE with its components: profit margin (*PMARG*), asset turnover (*ATURN*), and financial leverage (*FLEV*). We replaced the cost of equity with the risk-free rate (*TBILL*) in the country where the share is listed, and the firm-specific equity premium (*PREM*).

In all cases, Hypothesis 1, which states that Canadian-listed firms are valued at a discount to U.S.-listed firms, is tested by examining whether the coefficient of the *CTRY* dummy is positive and statistically significant. We expect to find a positive coefficient, which implies a discount relative to U.S.-listed firms. The interpretation on cross-listed firms is more difficult, because this specification does not compare the cross-listed firms and the non-cross-listed firms directly. Instead, the reference case is U.S. firms. For this reason, the sum of the coefficients *CROSS* and *CTRY* provides a measure of the relative valuation of cross-listed firms to U.S. firms. An F-test is used to determine whether this coefficient is statistically different from zero.

Hypothesis 2, which states that cross-listed Canadian firms are valued at a premium to exclusively Canadian-listed firms because of the impact of reputational bonding, is tested by restricting the sample to those two groups of firms and re-estimating the equations. This sample indicates the likely impact of investor protection by comparing two sets of firms that are chiefly distinguished by the level of scrutiny they receive from regulators and investors. The cross-listed firms are subject to regulation and supervision by the SEC, and are exposed to the scrutiny of reputational intermediaries in the U.S. markets (Coffee 2002). We estimate the following two models:

$$BM_{it} = a + \beta_1 SIZE_{it} + \beta_2 ROE_{it} + \beta_3 K_{it} + \beta_4 SALES_{it} + \beta_5 LOSS_{it} + \beta_6 CROSS_{it} + \beta_n NAICS_{it} + \beta_k YEAR_t + e_{it}, \quad (3)$$

$$EP_{it} = a + \beta_1 SIZE_{it} + \beta_2 ROE_{it} + \beta_3 K_{it} + \beta_4 SALES_{it} + \beta_5 LOSS_{it} + \beta_6 CROSS_{it} + \beta_n NAICS_{it} + \beta_k YEAR_t + e_{it}, \quad (4)$$

where *CROSS* is a dummy variable with 1 for cross-listed observations, and 0 otherwise, and all other variables are as before. All the firms in this comparison are Canadian, so the dummy variable *CTRY* is not required. If cross-listed Canadian firms are valued at a premium relative to non-cross-listed Canadian firms, then we expect to find a negative coefficient on the *CROSS* variable, indicating that cross-listed firms have higher multiples of book value and past earnings.

Although the regressions on Canadian firms highlight the impact of cross-listing on valuation, they do not isolate the impact of bonding. The impact of investor protection is not identified in these regressions, because the effect could be due to other factors. Recall that Hypothesis 3 predicts that cross-listed firms that bond to the U.S. markets will have higher valuations and greater share turnover on U.S. stock exchanges than other cross-listed firms that do not bond. We try to capture this effect by dividing our cross-listed sample into two groups based on the primary location of their trading. We collected data on relative share turnover on the TSX and on the U.S. exchanges

— the NYSE, NASDAQ, and AMEX — for all the cross-listed firms in our sample. The source for this data is the *TSX Review*, a monthly publication of the Toronto Stock Exchange. The *TSX Review* reports the total volume of trading on Canadian and U.S. stock exchanges, the total value of trading, and the percentage of traded value by stock exchange. We construct two variables that relate relative turnover in these two markets, based on the ratio of U.S. turnover to Canadian turnover. *CROSSHI* identifies 322 observations of firms that have greater U.S. turnover than Canadian turnover. *CROSSLO* identifies 652 observations of firms that have greater Canadian turnover than U.S. turnover. Relative turnover for cross-listed firms varies considerably, with a mean ratio of U.S. to Canadian turnover of 2.6 times and a median ratio of 0.47 times. Although some cross-listed firms experience almost no share turnover on U.S. exchanges, others have almost no share turnover on the TSX.

We estimate the same regressions as before, but substitute *CROSSHI* and *CROSSLO* for the dummy variable *CROSS*. When comparing all three samples of firms in equations (1) and (2), our expectation is that the coefficient on *CROSSHI* will be negative and significant, which implies that Canadian firms that are traded predominantly on a U.S. stock exchange receive a higher valuation relative to non-cross-listed firms. We expect that the coefficient on *CROSSLO* will be positive and significant, which would suggest that Canadian firms that fail to bond to the U.S. markets and remain traded predominantly in the home market following cross-listing have a lower valuation. In those cases, the relationship between U.S. firms and cross-listed firms is the sum of the coefficients on *CTRY* and either *CROSSHI* or *CROSSLO*. When we compare Canadian cross-listed firms with Canadian firms listed exclusively on the TSX in equations (3) and (4), we expect the coefficient on *CROSSHI* to be positive and significant, which implies a premium valuation for cross-listed firms. The variable *CROSSLO*, however, should not be statistically different from zero, because we expect that Canadian investors will not view these firms any differently from other non-cross-listed firms.

As a final robustness check on our results, we compare the cross-listed Canadian firms with the U.S. firms, excluding the Canadian firms that are not cross-listed. Although this comparison is implicit in the panel regressions using all three samples in equations (1) and (2), it provides a useful check on our results. We expect to find that cross-listed firms that are traded actively in the U.S. have similar valuations to U.S. firms, and that the Canadian firms that fail to bond are valued at a discount. This comparison is made by repeating the regressions in equations (3) and (4), but restricting the sample to U.S. firms and cross-listed Canadian firms. In this case, the reference firm is a U.S. firm in the manufacturing, trade, and services sector.

All of these regressions are estimated using panel regressions with random effects, in order to capture unobserved firm-specific heterogeneity. Panel methods capture both the time-series dimension of the data and the cross-sectional dimension, and assume a particular structural form for the residuals (Wooldridge 2002). The random-effects approach assumes that part of the residual is firm-specific but random, although it remains unidentified. This assumption is less restrictive than the fixed effects approach that assumes the firm-specific residual is constant over time. These estimations are performed using Stata 8.0.

6. Empirical Results

Table 5 shows the results of the regressions on all firms using random effects based on the specifications in equations (1) and (2). The first two columns show regressions on book-to-market, and the final two columns show regressions on earnings-to-price. Year dummies are included in all regressions, but are not shown. These dummy variables are negative and statistically significant for all years, which implies that valuations from 1991 onwards are consistently higher than in 1990. Industry dummies are included for four out of five industries, with manufacturing, trade, and service sector firms as the base or reference industry, because they represent the greatest number of observations in each sample. The key variables of interest are the country dummy variable that highlights the impact on valuation of being a Canadian firm, and the cross-listing dummy variable that picks up the impact of being listed on both a Canadian and a U.S. stock exchange.

The direction and statistical significance on the control variables are consistent throughout all the regressions that follow. Recall that a negative coefficient implies a higher valuation (lower book-to-market or earnings-to-price), while a positive coefficient implies a lower valuation. The log of size has a positive coefficient in regressions on book-to-market, which implies that larger firms are valued at a discount to smaller firms, consistent with the size effect documented in the literature. Size has the opposite effect in regressions on earnings-to-price, which implies that smaller firms have a higher valuation on this measure. The coefficient of ROE shows a similar relationship because it is negative and significant for regressions on book-to-market, which suggests that more profitable firms have higher valuations in a given sample. The coefficient is negative when using earnings-to-price, which supports a view of mean reversion of earnings.[18] The decomposition of

[18] Bauman, Conover, and Cox (2002) and Fama and French (2000) document mean reversion of earnings.

ROE shows that this effect is driven by asset turnover and financial leverage.[19] The coefficient on cost of equity is negative and significant in most regressions, with the impact larger for regressions on book-to-market. The components of cost of equity are pulling in opposite directions, with the firm-specific premium negative and significant in most regressions, while the risk-free rate is positive and significant in fewer cases. Higher past sales growth is associated with a higher valuation in regressions on book-to-market, but a lower valuation in regressions on earnings-to-price.[20]

The changing direction of these control variables, which change signs when using book-to-market and earnings-to-price, appear to be driven by the inclusion of firms with losses. The dummy variable for losses is positive and significant for regressions on book-to-market, which implies that firms experiencing negative earnings before extraordinary items have a lower valuation than firms with positive earnings. When using earnings-to-price, the impact of losses is to increase or over-inflate a firm's valuation.[21] When the regressions are run excluding observations of firms with losses, however, the direction and statistical significance are consistent for both valuation measures. These results are not shown but are available upon request.

The country dummy variable is positive and significant in the regressions on book-to-market, and positive but only significant in one case in the regressions on earnings-to-price. The positive coefficient implies that Canadian firms are valued at a discount relative to U.S. firms in this sample. This discount is economically important, because the coefficient implies a discount of over 20 per cent based on multiples of book value and 10 per cent based on multiples of earnings. These results support Hypothesis 1 that Canadian firms listed exclusively in the home market are valued at a discount to U.S. firms, after controlling for firm-specific characteristics.

The coefficient on the dummy variable for cross-listed firms is negative and significant in all cases, which implies that cross-listed firms in this sample have a higher valuation than the non-cross-listed Canadian ones. In this case, the premium amounts to 8.5 to 9.9 per cent of book value and 1.4 to 1.5 per cent of past earnings. The relationship between cross-listed Canadian firms and

---

[19] Because financial leverage is measured as total assets over equity in the Dupont formula, a higher financial leverage ratio implies less equity and more debt for a given set of assets. Greater leverage leads to a higher valuation, as shown by the negative coefficient.

[20] The results using book-to-market are consistent with the results in Doidge, Karolyi, and Stulz (2004), who use Tobin's q.

[21] A negative price-earnings ratio has no economic meaning. In practice, investors use a forward-looking measure of earnings, not a backward-looking measure as used in this study. Forward-looking estimates of earnings per share are not available for a large enough sample of Canadian firms.

U.S. firms is based on the sum of the two dummy variables, with an F-test used to determine whether the sum of the coefficients is different from zero. The sum of the coefficients of the cross-listing dummy and the country dummy is statistically different from zero when using book-to-market, although the country effect dominates. Cross-listing generally mitigates the country discount for Canadian firms, on this measure. When using earnings-to-price, the F-test cannot reject the null hypothesis that the sum of the coefficients is zero, which implies that cross-listed firms are valued similarly to U.S. firms with the same characteristics on the basis of this measure.

While the regressions in Table 5 appear to support Hypothesis 2 — that cross-listed firms are valued at a premium to exclusively Canadian-listed firms, after controlling for firm-specific characteristics — this relationship is tested directly by estimating the regressions using only the Canadian firms. Table 6 shows the results of this estimation. Note the consistency in the direction and statistical significance on the control variables with the estimations in Table 5. The coefficient on the dummy variable for cross-listed firms in Table 6 is negative and significant in columns 1 and 2, which implies a 12.4 to 13.6 per cent premium for cross-listed firms on the basis of book value. The coefficient is not statistically significant in columns 3 and 4, which implies that cross-listed firms are valued similarly to non-cross-listed firms on the basis of past earnings. This finding is consistent with the results in Table 5, and provides support for Hypothesis 2. Cross-listing may lead to an increase in valuation, depending on the valuation measure that is being considered. Given the higher incidence of losses among cross-listed firms, as shown in Panel E of Table 3, we find the results using book-to-market more convincing. This result is consistent with the bonding hypothesis, because it suggests that those firms that are exposed to the scrutiny of the U.S. markets have a higher valuation. These regressions, however, do not prove the bonding hypothesis, because the effect could be due to other factors that are not controlled for directly in these regressions.

To test for the impact of bonding on valuation in Hypothesis 3, we re-estimate the regressions above using two dummy variables — *CROSSHI* and *CROSSLO* — in the place of the dummy variable for cross-listed firms. *CROSSHI* takes on a value of one for cross-listed firms that have greater turnover on U.S. stock exchanges than on the TSX, and zero otherwise. *CROSSLO* takes on a value of one for firms that have greater turnover on the TSX than on U.S. stock exchanges, and zero otherwise. We argue that the relative location of share turnover is a proxy or indicator of the degree of reputational bonding to the U.S. regulatory regime, because it indicates the degree of investor confidence that their shareholder rights will be respected. Table 7 shows the results of this estimation in regressions on U.S. and Canadian firms. All the control variables have similar

coefficients and statistical significance as the results in Table 5. The country dummy is positive and significant in three out of four regressions, which implies a discount for Canadian firms. The coefficient on *CROSSLO* is negative but only weakly significant (at the 10 per cent level) in three out of four regressions, which implies a small premium to non-cross-listed Canadian firms. The F-tests of the sum of *CROSSLO* and the country dummy imply that cross-listed firms that remain predominantly traded on the TSX are valued at a discount to U.S. firms on the basis of book value, but are valued similarly on the basis of past earnings.

By contrast, the coefficient on *CROSSHI* is negative and significant at the 1 per cent level in the regressions using book-to-market, which implies a higher valuation relative to other Canadian firms for cross-listed firms that are traded predominantly on a U.S. stock exchange. The location of share turnover does not affect the valuation on the basis of earnings-to-price. The F-tests suggest that these cross-listed firms are valued similarly to U.S. firms when using both multiples of book value and past earnings. This finding provides clear support for the view that reputational bonding has a positive impact on valuation.

Table 8 shows the results of these regressions when including only Canadian firms in the sample. The results confirm the earlier findings. Cross-listed firms that remain predominantly traded on the TSX are valued similarly to non-cross-listed firms, as shown by the statistically insignificant coefficients on the dummy variable, *CROSSLO*. By contrast, cross-listed firms that are predominantly traded on the U.S. stock exchanges have a premium valuation that is large and economically important. Cross-listing increases valuations by 21.4 to 23.2 per cent, measured using book value. This finding has not been shown before in the cross-listing literature, which views cross-listing as having a positive effect for all firms that cross-list. These results suggest that firms that cross-list but do not attract the secondary trading and sponsorship on U.S. markets do not enjoy the benefits of cross-listing, despite having paid the costs in terms of listing fees and regulatory filings. Instead, U.S. investors differentiate between the cross-listed firms, and concentrate their trading in a subset of firms that see an increase in their valuation.

The regressions in Tables 9 and 10 provide a robustness check on the earlier results. They allow a direct comparison to be made between cross-listed firms and U.S. firms, by excluding Canadian firms that are listed solely on the home market. In this case, the dummy variable for cross-listing picks up both the country effect and the impact of cross-listing. The same patterns emerge as described before. Table 9, with its statistically insignificant coefficient on the dummy variable for cross-listing, shows that cross-listed firms are valued similarly to U.S. firms on the basis of book value and past earnings. These results are interesting, because they suggest that U.S. investors

may not exhibit the same degree of home bias towards cross-listed firms, consistent with the findings in Ahearne, Griever, and Warnock (2001).

Table 10 provides a sharply different picture that highlights the value of differentiating between cross-listed firms on the basis of their location of trading. In these regressions, the cross-listed firms that are traded predominantly on the TSX are valued at a discount of 11.3 to 12.9 per cent on the basis of book value relative to the average U.S. firm, while their valuation based on earnings is not statistically different. The cross-listed firms that attract sponsorship in the U.S. stock markets are valued similarly to U.S. firms. This difference in valuation among the cross-listed firms was hidden when all the cross-listed firms are grouped together, because the offsetting effects on valuation led the overall effect to be neutral. Table 10 shows that there are clear benefits to cross-listing when reputational bonding occurs, despite the fact that U.S. investors continue to exhibit home bias against a subset of cross-listed firms.

7. Conclusion

We have described a new view of the impact of cross-listing that links valuation to a firm's ability to develop an active secondary market for its shares in the U.S. stock markets. Contrary to previous research, cross-listing may not provide benefits for all firms, even when those firms meet the highest regulatory requirements for disclosure and supervision. When cross-listed firms are divided into two groups based on the ratio of their share turnover in the home market relative to the U.S. market, the firms that develop active trading in the U.S. market are valued more highly than the cross-listed firms that remain predominantly traded in the home market based on multiples of book value. Cross-listed Canadian firms that do not develop active trading in the United States following cross-listing are valued similarly to non-cross-listed Canadian firms. We have argued that this premium valuation is linked to the firm's reputation among U.S. investors, and is consistent with the bonding hypothesis developed by Coffee (1999) and Stulz (1999). We have also argued that a foreign firm, to gain the full benefits of cross-listing, must convince investors that their shareholder rights will be protected. U.S. investors may then be willing to consider the foreign firm for inclusion in their portfolio. The amount of trading on the U.S. market may therefore be viewed as a proxy for the degree to which a foreign firm has been successful in bonding to the U.S. markets. This research supports the view that reputational bonding is what matters, not legal bonding.

We have reported results that are supportive of the bonding hypothesis using a new proxy for reputational bonding based on insights from Siegel (2004). The next step is to test the results

using other measures of bonding proposed in earlier studies, such as the location of subsequent equity issuance (Reese and Weisbach 2002). For example, some firms cross-list at the time of their initial public offering, and others pursue secondary equity offerings subsequent to cross-listing. The amount of time and effort spent on investor relations connected to such an offering, as well as the reputation of the underwriters, should affect the degree of reputational bonding. Other factors to consider are whether the cross-listed firm subsequently engaged in an acquisition paid for by stock, and how much of the firm's sales take place in the U.S. market.

More importantly, future research on bonding will need to control for other factors that are likely to affect the degree of reputational bonding and subsequent trading in the U.S. market. Ownership structure is an important factor. Although a time-series database of the ownership structure of Canadian firms is not available, Doidge (2004) and Nenova (2003) demonstrate the value of accounting for the existence of dual classes of shares or similar arrangements that lead to a separation between cash flow rights and voting rights. An important contribution of future research would be to capture the impact of ownership structure on secondary trading.

Bibliography

Aheame, A.G., W.L. Griever, and F.E. Warnock. 2001. "Information Costs and Home Bias: An Analysis of U.S. Holdings of Foreign Equities." International Financial Discussion Paper No. 691, Board of Governors of the Federal Reserve System.

Attig, N., Y. Gadhoum, and L.H.P. Lang. 2002. "Ultimate Ownership of the U.S. and Canada." Laval University. Photocopy.

Bailey, W., G.A. Karolyi, and C. Salva. 2002. "The Economic Consequences of Increased Disclosure: Evidence from International Cross-Listings." Cornell University. Photocopy.

Baker, H.K., J.R. Nofsinger, and D.G. Weaver. 2002. "International Cross-Listing and Visibility." *Journal of Financial and Quantitative Analysis* 37(3): 495–521.

Bancel, F. and U.R. Mittoo. 2001. "European Managerial Perceptions of the Net Benefits of Foreign Stock Listings." *European Financial Management* 7(2): 213–36

Bandyopadhyay, S.P., A.S. Hilton, and G. Richardson. 2002. "A Re-examination of Reconciling Items Between Canadian and United States GAAP." *Managerial Finance* 28(3): 37–56.

Bauman, W.S., C.M. Conover, and D.R. Cox. 2002. "Are the Best Small Firms the Best Investments?" *Journal of Financial Research* 25(2): 169–86.

Benos, E. and M.S. Weisbach. 2003. "Private Benefits and Cross-Listings in the United States: A Survey of Recent Research Estimating Private Benefits and the Role of Cross-Listings as a Bonding Mechanism." University of Illinois. Photocopy.

Bhattacharya, U. and H. Daouk. 2002. "The World Price of Insider Trading." *Journal of Finance* 57(1): 75–108.

Blass, A. and Y. Yafeh. 2001. "Vagabond Shoes Longing to Stray: Why Foreign Firms List in the United States." *Journal of Banking and Finance* 25(3): 555–72.

Bris, A. 2003. "Do Insider Trading Laws Work?" Yale School of Management. Photocopy.

Chan, K.C., W-M. Fong, and R.M. Stulz. 1994. "Information, Trading and Stock Returns: Lessons From Dually-Listed Securities." National Bureau of Economic Research Working Paper No. 4743 (May), 21.

Claus, J. and J. Thomas. 2001. "Equity Premia as Low as Three Percent? Evidence from Analysts' Earnings Forecasts for Domestic and International Stock Markets." *Journal of Finance* 56(5): 1629–66.

Coffee, J.C. 1999. "The Future as History: The Prospects for Global Convergence in Corporate Governance and Its Implications." *Northwestern University Law Review* 93(3): 641–708.

_____. 2002. "Racing Towards the Top?: The Impact of Cross-Listings and Stock Market Competition on International Corporate Governance." Columbia University Center for Law and Economic Studies Working Paper No. 205.

Coval, J.D. and T.J. Moskowitz. 1999. "Home Bias at Home: Local Equity Preferences in Domestic Portfolios." *Journal of Finance* 54(6): 2045–73.

Dahlquist, M., L. Pinkowitz, R.M. Stulz, and R. Williamson. 2002. "Corporate Governance and The Home Bias." Ohio State University. Photocopy.

Damodoran, A. 2002. "Estimating Equity Risk Premiums." Stern School of Business, NYU. Photocopy.

Doidge, C. 2004. "U.S. Cross-Listings and the Private Benefits of Control: Evidence from Dual Class Firms." *Journal of Financial Economics*, forthcoming.

Doidge, C., G.A. Karolyi, and R. Stulz. 2004. "Why Are Foreign Firms Listed in the U.S. Worth More?" *Journal of Financial Economics*, forthcoming.

Domowitz, I., J. Glen, and A. Madhavan. 1998. "International Cross-Listing and Order Flow Migration: Evidence from an Emerging Market." *Journal of Finance* 53(6): 2001–27.

Doukas, J. and L.N. Switzer. 2000. "Common Stock Returns and International Listing Announcements: Conditional Tests of the Mild Segmentation Hypothesis." *Journal of Banking and Finance* 24(3): 471–502.

Dyck, A. and L. Zingales. 2003. "Private Benefits of Control: An International Comparison." *Journal of Finance*, forthcoming.

Eckbo, B.E. and K.S. Thorburn. 2000. "Gains to Bidder Firms Revisited: Domestic and Foreign Acquisitions in Canada." *Journal of Financial and Quantitative Analysis* 35(1): 1–25.

Errunza, V.R. and E. Losq. 1985. "International Asset Pricing under Mild Segmentation: Theory and Test." *Journal of Finance* 40(1): 105–24.

Errunza, V.R. and D.P. Miller. 2000. "Market Segmentation and the Cost of Capital in International Equity Markets." *Journal of Financial and Quantitative Analysis* 35(4): 577–600.

Eun, C.S. and S. Sabherwal. 2003. "Cross-Border Listings and Price Discovery: Evidence from U.S. Listed Canadian Stocks." *Journal of Finance* 57(2): 549–75.

Fama, E.F. and K.R. French. 1992. "The Cross-Section of Expected Stock Returns." *Journal of Finance* 47(2): 427–65.

_____. 2000. "Forecasting Profitability and Earnings." *Journal of Business* 73(2): 161–75.

Foerster, S.R. and G.A. Karolyi. 1993. "International Listings of Stocks: The Case of Canada and the U.S." *Journal of International Business Studies* 24: 763–84.

_____. 1998. "Multimarket Trading and Liquidity: A Transaction Data Analysis of Canada-U.S. Interlistings." *Journal of International Financial Markets, Institutions and Money* 8(3-4): 393–412.

_____. 1999. "The Effects of Market Segmentation and Investor Recognition on Asset Prices: Evidence from Foreign Stocks Listing in the United States." *Journal of Finance* 54(3): 981–1013.

Gagnon, L. and G.A. Karolyi. 2003. "Multi-Market Trading and Arbitrage." Queen's University. Photocopy.

Graham, J.R. and C.R. Harvey. 2001. "The Theory and Practice of Corporate Finance: Evidence from the Field." *Journal of Financial Economics* 60(2-3): 187–243.

Hasan, I. and Y. Simaan. 2000. "A Rational Explanation for Home Country Bias." *Journal of International Money and Finance* 19(3): 331–61.

Huberman, G. 2001. "Familiarity Breeds Investment." *Review of Financial Studies* 14(3): 659–80.

Insider Trading Task Force. 2003. *Illegal Insider Trading in Canada: Recommendations on Prevention, Detection, and Deterrence.*

Jabbour, A.R., A. Jalilvand, and J.A. Switzer. 2000. "Pre-Bid Run-Ups and Insider Trading Activity: Evidence from Canadian Acquisitions." *International Review of Financial Analysis* 9(1): 21–43.

Karolyi, G.A. 1998. "Why Do Firms List Shares Abroad?: A Survey of the Evidence and Its Managerial Implications." *Financial Markets, Institutions and Instruments* 7(1): 1–60.

Karolyi, G.A. and R.M. Stulz. 2002. "Are Financial Assets Priced Locally or Globally?" NBER Working Paper No. 8994, Cambridge, MA.

Lang, M.H., K.V. Lins, and D.P. Miller. 2003. "ADRs, Analysts and Accuracy: Does Cross-Listing in the U.S. Improve a Firm's Information Environment and Increase Market Value?" *Journal of Accounting Research* 41(2): 317–45.

La Porta, R., F. Lopez-de-Silanes, A. Shleifer, and R. Vishny. 1998. "Law and Finance." *Journal of Political Economy* 106(6): 1113–55.

_____. 2000. "Investor Protection and Corporate Governance." *Journal of Financial Economics* 58(1-2): 3–27.

_____. 2002. "Investor Protection and Corporate Valuation." *Journal of Finance* 57(3): 1147–70.

Leuz, C. 2002. "Discussion of ADRs, Analysts, and Accuracy: Does Cross-Listing in the U.S. Improve a Firm's Information Environment and Increase Market Value?" University of Pennsylvania. Photocopy.

Lewis, K. 1999. "Trying to Explain Home Bias in Equities and Consumption." *Journal of Economic Literature* 37(2): 571–608.

McNally, W.J. and B.F. Smith. 2003. "Do Insiders Play by the Rules?" Canadian Public Policy 29(2): 125–44.

Merton, R.C. 1987. "A Simple Model of Capital Market Equilibrium with Incomplete Information." *Journal of Finance* 42(3): 483–510.

Miller, D.P. 1999. "The Market Reaction to International Cross-Listings: Evidence from Depositary Receipts." *Journal of Financial Economics* 51(1): 103–23.

Mittoo, U.R. 1992. "Additional Evidence on Integration in the Canadian Stock Market." *Journal of Finance* 47(5): 2035–54.

_____. 2003. "Globalization and the Value of U.S. Listings: Revisiting Canadian Evidence." *Journal of Banking and Finance* 27(9): 1629–61.

Morck, R.K., ed. 2000. *Concentrated Corporate Ownership*. Chicago: University of Chicago.

Morck, R.K., D.A. Stangeland, and B. Yeung. 2000. "Inherited Wealth, Corporate Control and Economic Growth: The Canadian Disease." In *Concentrated Corporate Ownership*. Chicago: University of Chicago.

Nenova, T. 2003. "The Value of Corporate Voting Rights and Control: A Cross-Country Analysis." *Journal of Financial Economics* 68(3): 325–51.

Pagano, M., A. Roell, and J. Zechner. 2001. "What Makes Stock Exchanges Succeed? Evidence from Interlisting Decisions." *European Economic Review* 45(4-6): 770–82.

Portes, R., H. Rey, and Y. Oh. 2001. "Information and Capital Flows: The Determinants of Transactions in Financial Assets." *European Economic Review* 45(4-6): 783–96.

Reese, W.A. and M.S. Weisbach. 2002. "Protection of Minority Shareholder Interests, Cross-Listings in the United States, and Subsequent Equity Offerings." *Journal of Financial Economics* 66: 65–104.

Sarkissian, S. and M.J. Schill. 2003. "The Overseas Listing Decision: New Evidence of Proximity Preference." Darden School of Business Working Paper No. 03-07. Photocopy.

Siegel, J. 2004. "Can Foreign Firms Bond Themselves Effectively by Renting U.S. Securities Laws?" *Journal of Financial Economics*, forthcoming.

Smith, K. and G. Sofianos. 1997. "The Impact of an NYSE Listing on the Global Trading of Non-U.S. Stocks." NYSE Working Paper No. 97-02.

Stulz, R.M. 1995. "The Cost of Capital in Internationally Integrated Markets: The Case of Nestle." *European Financial Management* 1(1): 11–22.

_____. 1999. "Globalization, Corporate Finance, and the Cost of Capital." *Journal of Applied Corporate Finance* 26: 3–28.

Sundaram, A. and D. Logue. 1996. "Valuation Effects of Foreign Country Listing on U.S. Exchanges." *Journal of International Business Studies* 27: 67–88.

Tribukait, H.V. 2002. "The Invisible Enforcer? Price Behavior of Mexican Firms Cross-Listed on the NYSE Around Earnings Announcements." Harvard University. Photocopy.

Wooldridge, J.M. 2002. *Econometric Analysis of Cross Section and Panel Data*. Cambridge, MA: MIT Press.

Table 1: Ratings of Shareholder and Creditor Rights of Canada and United States

The following table lists the categories of shareholder and creditor rights for Canada and the United States, as reported by La Porta et al. (1998).

Country name	Canada	U.S.
Legal origin of company law or commercial code	Common	Common
Multiple classes of voting shares allowed (one share – one vote=0)	Yes	Yes
Proxy voting by mail allowed	Yes	Yes
Shares not blocked before shareholders' meeting	No	No
Cumulative voting for board of directors	Yes	Yes
Oppressed minorities mechanism	Yes	Yes
Existing shareholders have preemptive rights for new equity issues	Yes	Yes
Percentage of share capital to call an extraordinary shareholders' meeting	5%	10%
Index of antidirector rights (0=lowest, 6=highest)	5.00	5.00
Mandatory dividend in law	No	No
Restrictions for going into reorganization	No	No
Automatic stay on secured assets in reorganization	Yes	Yes
Secured creditors first in liquidation	Yes	Yes
Management stays during reorganization	Yes	Yes
Index of creditors' rights (0=lowest 4=highest)	1.00	1.00
Legal restriction on minimum percentage of share capital to avoid	No	No
Efficiency of judicial system (0=lowest, 10=highest)	9.25	10.00
Rule of law (rescaled 0=lowest, 10=highest)	10.00	10.00
Risk of expropriation (0=highest, 10=lowest)	9.67	9.98
Risk of contract repudiation (0=highest, 10=lowest)	8.96	9.00
Accounting standards (0=lowest, 100=highest)	74.00	71.00
Average per cent of common shares owned by three largest shareholders	40%	20%

Table 2: Ownership Structure of Canadian Firms

The following table reports the ownership structure for 1,093 Canadian firms for the year 1996, as reported by Attig, Gadhoum, and Lang (2002). Firms are classified into five categories based on their majority shareholder with a 10 per cent ownership stake, or a 20 per cent ownership stake.

Panel A: Controlling shareholder (per cent)

	10 per cent cut-off	20 per cent cut-off
Widely held firms	18.8	36.8
Family controlled firms	55.4	41.0
State controlled firms	4.3	1.9
Widely held financial institution	17.1	10.7
Unclassified	4.4	9.6

Panel B: Means of enhancing control (per cent)

Multiple control chains	8.1
Multiple classes of shares	17.2
Non-voting shares	6.5

Table 3: Descriptive Statistics of Sample

This table reports descriptive statistics of the three categories of firms in the sample. "U.S." means U.S. firms listed on a U.S. stock exchange but not on a Canadian stock exchange. "Canada" means Canadian firms that are listed only on the Toronto Stock Exchange (TSX). "Cross-listed" means Canadian firms that have a listing on both the TSX and a listing on a U.S. stock exchange. Panel A shows the number of firms and observations in each sample. Panel B gives statistics on their market value in U.S. dollars, using end-of-year exchange rates. The median, 5, and 95 percentiles provide a picture of the distribution of each category of firm. Panel C shows the number of observations by year for each sample. Panel D shows the industry membership of each sample. Panel E gives the incidence of negative earnings (losses) for each sample as a percentage of total observations in a given year.

Panel A: Number of firms in each sample

Sample	U.S.	Canada	Cross-listed
Firms	6,761 88%	717 9%	206 3%
Observations	37,758 90%	3,367 8%	974 2%
Median years in sample	5	3	4

Panel B: Market value (U.S. dollars in millions)

Sample	U.S.	Canada	Cross-listed
Mean	$2,247.6	$536.7	$2,437.0
Median	$195.4	$112.1	$550.4
Standard deviation	$12,127.7	$1,523.6	$7,831.3
5 percentile	$16.8	$13.0	$31.5
95 percentile	$7,863.8	$2,254.4	$10,510.3

Panel C: Annual observations in each sample

Year	U.S.	Canada	Cross-listed	Total
1990	2,518	172	44	2,734
1991	2,393	159	44	2,596
1992	2,537	155	50	2,742
1993	2,648	165	53	2,866
1994	3,146	237	58	3,441
1995	3,301	267	78	3,646
1996	3,537	306	92	3,935
1997	3,723	328	102	4,153
1998	3,598	352	110	4,060
1999	3,551	418	111	4,080
2000	3,467	423	118	4,008
2001	3,339	385	114	3,838
Total	37,758	3,367	974	42,099

(continued)

Table 3 (concluded)

Panel D: Industry membership in each sample*

Industry	U.S.	Canada	Cross-listed	Total	Dummy
Financial services, real estate	8,674 23%	437 13%	71 7%	9,182 22%	naic1
High-technology	8,894 24%	654 19%	202 21%	9,750 23%	naic2
Transportation, utilities	2,607 7%	169 5%	51 5%	2,827 7%	naic3
Mining, oil and gas, forestry	1,951 5%	769 23%	321 33%	3,041 7%	naic4
Manufacturing, services, trade	15,632 41%	1,338 40%	329 34%	17,299 41%	naic5
Total	37,758 100%	3,367 100%	974 100%	42,099 100%	

* This panel shows the distribution of observations for five industries. Industry dummy variables (naic1 – naic5) are constructed based on NAICS codes as follows: financial services and real estate = 2-digit codes 52 and 53; high-technology = 2-digit code 51, 3-digit codes 333, 334, and 4-digit code 5415; transportation and utilities = 2-digit codes 22, 48, and 49; mining, oil and gas, and forestry = 2-digit code 21, 3-digit codes 321 and 322; and other = all remaining observations not included in the other categories, predominantly manufacturing, wholesale and retail trade, and services.

Panel E: Incidence of losses for each sample (per cent)

Year	U.S.	Canada	Cross-listed	Total
1990	16.4	20.9	29.5	16.9
1991	19.6	24.5	38.6	20.2
1992	19.3	23.2	36.0	19.8
1993	19.6	18.2	32.1	19.8
1994	15.5	8.4	17.2	15.1
1995	16.0	14.2	26.9	16.1
1996	17.6	16.7	28.3	17.7
1997	17.5	16.2	31.4	17.8
1998	19.7	22.4	38.2	20.4
1999	19.5	22.7	30.6	20.1
2000	20.1	23.6	32.2	20.8
2001	27.0	32.2	37.7	27.9
Total	19.0	20.8	31.9	19.5

Table 4: Descriptive Statistics on Key Variables by Sample
This table reports descriptive statistics on the key variables used in the regressions.

	U.S.	Canada	Cross-listed
BOOK-TO-MARKET			
Mean	0.6934	0.9012	0.7964
Standard deviation	0.6056	0.8034	0.8436
Min	0.1285	0.1737	0.0473
Max	1.6854	2.2082	8.2916
EARNINGS-TO-PRICE			
Mean	0.0254	0.0275	-0.0070
Standard deviation	0.1734	0.2144	0.2831
Min	-0.1777	-0.2403	-3.0395
Max	0.1440	0.2047	1.1459
LOG OF *SIZE* (US$ MM)			
Mean	5.8838	5.3551	6.6326
Standard deviation	2.0198	1.8237	2.0439
Min	2.9061	2.8621	1.8088
Max	9.4892	8.5030	12.1633
RETURN ON EQUITY			
Mean	0.0765	0.0533	0.0166
Standard deviation	0.3225	0.2060	0.2240
Min	-0.3221	-0.3439	-0.9706
Max	0.2858	0.2744	0.8179
COST OF EQUITY			
Mean	0.0816	0.0743	0.0761
Standard deviation	0.0241	0.0252	0.0212
Min	0.0466	0.0450	0.0311
Max	0.1249	0.1341	0.1623
SALES GROWTH			
Mean	0.1821	0.3308	0.2730
Standard deviation	0.4530	0.8127	0.6960
Min	-0.1338	-0.1708	-0.6770
Max	0.6759	1.3732	7.5434

Table 5: Panel Regressions (Random Effects) Using All Firms, 1990–2001
This table reports panel regressions with random effects on all firms. The dependent variable is book-to-market (bm) in columns 1 and 2, and earnings-to-price (ep) in columns 3 and 4. Two specifications are run for each regression. In the first specification, the control variables are return on equity, cost of equity, sales growth, and a dummy variable for firms with negative earnings before extraordinary items. In the second specification, ROE is replaced with profit margin, asset turnover and financial leverage, and cost of equity with the risk-free rate and the company-specific equity market premium. A cross-listing dummy takes a value of 1 for cross-listed firms, and zero otherwise. A country dummy takes a value of 1 for Canadian firms and zero otherwise. Industry dummies are based on NAICS codes, with manufacturing, trade, and services as the reference industry. Dummy variables for the years 1991 to 2001 are included but not shown. Standard errors are shown in parentheses.

	(1)	(2)	(3)	(4)
	bm	bm	ep	ep
Log of size (US$ mm)	0.048***	0.054***	-0.003***	-0.001*
	(0.003)	(0.003)	(0.001)	(0.001)
Return on equity	-0.118***		0.163***	
	(0.010)		(0.003)	
Profit margin		0.001*		-0.001
		(0.001)		(0.001)
Asset turnover		-0.032***		0.001
		(0.006)		(0.002)
Financial leverage		-0.013***		-0.001***
		(0.001)		(0.001)
Cost of equity	-0.656***		-0.130***	
	(0.152)		(0.044)	
T-bill		1.228***		-0.184
		(0.471)		(0.154)
Firm-specific premium		-0.872***		-0.209***
		(0.160)		(0.047)
Sales growth	-0.061***	-0.062***	0.008***	0.010***
	(0.005)	(0.005)	(0.002)	(0.002)
Neg. earnings before extraordinary items	0.218***	0.261***	-0.191***	-0.245***
	(0.007)	(0.007)	(0.002)	(0.002)
Cross-listed	**-0.099*** **	**-0.085*** **	**-0.015***	**-0.014***
	(0.028)	**(0.029)**	**(0.008)**	**(0.008)**
Country	**0.231*** **	**0.212*** **	**0.010** **	**0.007**
	(0.024)	**(0.024)**	**(0.005)**	**(0.005)**
Financial services	0.034*	0.064***	0.002	0.013***
	(0.018)	(0.020)	(0.004)	(0.004)
High-tech	-0.183***	-0.196***	0.001	-0.002
	(0.018)	(0.018)	(0.003)	(0.004)
Transportation & Utilities	-0.075**	-0.096***	0.013**	0.011*
	(0.033)	(0.033)	(0.006)	(0.006)
Natural resources	-0.057**	-0.084***	0.001	-0.001
	(0.029)	(0.029)	(0.006)	(0.006)
Constant	0.699***	0.607***	0.076***	0.100***
	(0.027)	(0.044)	(0.007)	(0.013)
Year dummies	Yes	Yes	Yes	Yes
Observations	42099	42099	42099	42099
R-squared (overall)	0.065	0.062	0.330	0.300
F-test: country+cross-listed=0	0.001***	0.001***	0.522	0.351

* significant at 10 per cent; ** significant at 5 per cent; *** significant at 1 per cent

Table 6: Panel Regressions (Random Effects) Using Canadian Firms, 1990–2001
This table reports panel regressions with random effects on book-to-market and earnings-to-price for Canadian firms, excluding U.S. firms. See Table 5 for a description of the regressions. Standard errors are shown in parentheses.

	(1)	(2)	(3)	(4)
	bm	Bm	ep	ep
Log of size (US$ mm)	0.099***	0.119***	-0.006***	-0.002
	(0.013)	(0.013)	(0.002)	(0.003)
Return on equity	-0.276***		0.738***	
	(0.067)		(0.017)	
Profit margin		0.001		0.001
		(0.001)		(0.001)
Asset turnover		-0.024		0.003
		(0.029)		(0.006)
Financial leverage		-0.022***		-0.001
		(0.004)		(0.001)
Cost of equity	-0.276		0.095	
	(0.788)		(0.197)	
T-bill		1.482		0.330
		(1.613)		(0.501)
Firm-specific premium		-0.809		0.009
		(0.956)		(0.270)
Sales growth	-0.050***	-0.051***	-0.005	0.001
	(0.013)	(0.013)	(0.003)	(0.004)
Neg. earnings before extraordinary items	0.212***	0.309***	-0.059***	-0.299***
	(0.033)	(0.026)	(0.009)	(0.008)
Cross-listed	**-0.124*** **	**-0.136*** **	**-0.011**	**-0.007**
	(0.040)	**(0.040)**	**(0.009)**	**(0.011)**
Financial services	-0.073	-0.021	-0.026*	-0.001
	(0.102)	(0.105)	(0.016)	(0.018)
High-tech	-0.295***	-0.298***	-0.002	-0.011
	(0.080)	(0.080)	(0.013)	(0.013)
Transportation & Utilities	-0.224	-0.238	0.003	0.017
	(0.156)	(0.156)	(0.024)	(0.025)
Natural resources	-0.066	-0.088	-0.018	-0.018
	(0.074)	(0.078)	(0.012)	(0.013)
Constant	0.722***	0.493**	0.023	0.049
	(0.142)	(0.215)	(0.033)	(0.063)
Year dummies	Yes	Yes	Yes	Yes
Observations	4341	4341	4341	4341
R-squared (overall)	0.064	0.064	0.484	0.303

* significant at 10 per cent; ** significant at 5 per cent; *** significant at 1 per cent

Table 7: Panel Regressions (Random Effects) Using All Firms, 1990–2001
This table reports panel regressions with random effects on book-to-market and earnings-to-price for all firms. See Table 5 for a description of the regressions. Two dummy variables are used to identify cross-listed firms: *CROSSLO* takes a value of 1 for cross-listed firms that are predominantly traded on the TSX, and zero otherwise. *CROSSHI* takes a value of 1 for cross-listed firms that are predominantly traded on a U.S. stock exchange, and zero otherwise. Standard errors are shown in parentheses.

	(1)	(2)	(3)	(4)
	bm	bm	ep	ep
Log of size (US$ mm)	0.046***	0.052***	-0.003***	-0.001*
	(0.003)	(0.003)	(0.001)	(0.001)
Return on equity	-0.118***		0.163***	
	(0.010)		(0.003)	
Profit margin		0.001		-0.001
		(0.001)		(0.001)
Asset turnover		-0.030***		0.001
		(0.006)		(0.002)
Financial leverage		-0.013***		-0.001***
		(0.001)		(0.001)
Cost of equity	-0.610***		-0.139***	
	(0.152)		(0.044)	
T-bill		1.343***		-0.177
		(0.472)		(0.154)
Firm-specific premium		-0.827***		-0.221***
		(0.160)		(0.047)
Sales growth	-0.069***	-0.070***	0.009***	0.011***
	(0.005)	(0.005)	(0.002)	(0.002)
Neg. earnings before extraordinary items	0.216***	0.259***	-0.190***	-0.244***
	(0.007)	(0.007)	(0.002)	(0.002)
Turnover mostly TSE	**-0.056***	**-0.042**	**-0.016***	**-0.016***
(*CROSSLO*)	**(0.032)**	**(0.033)**	**(0.009)**	**(0.009)**
Turnover mostly U.S.	**-0.194*****	**-0.176*****	**-0.015**	**-0.014**
(*CROSSHI*)	**(0.043)**	**(0.043)**	**(0.012)**	**(0.012)**
Country	**0.220*****	**0.201*****	**0.010****	**0.007**
	(0.024)	**(0.024)**	**(0.005)**	**(0.005)**
Financial services	0.037**	0.069***	0.002	0.013***
	(0.018)	(0.020)	(0.004)	(0.004)
High-tech	-0.182***	-0.194***	0.001	-0.002
	(0.017)	(0.018)	(0.003)	(0.004)
Transportation & Utilities	-0.071**	-0.091***	0.013**	0.011*
	(0.033)	(0.033)	(0.006)	(0.006)
Natural resources	-0.052*	-0.078***	-0.001	-0.001
	(0.028)	(0.029)	(0.006)	(0.006)
Constant	0.702***	0.602***	0.077***	0.100***
	(0.027)	(0.044)	(0.007)	(0.013)
Year dummies	Yes	Yes	Yes	Yes
Observations	41944	41944	41944	41944
R-squared (overall)	0.067	0.103	0.329	0.300
F-test: country+*CROSSLO*=0	0.001***	0.001***	0.513	0.345
F-test: country+*CROSSHI*=0	0.553	0.576	0.687	0.576

* significant at 10 per cent; ** significant at 5 per cent; *** significant at 1 per cent

Table 8: Panel Regressions (Random Effects) Using Canadian Firms, 1990–2001
This table reports panel regressions with random effects on book-to-market and earnings-to-price for Canadian firms, excluding U.S. firms. See Table 5 for a description of the regressions. Two dummy variables are used to identify cross-listed firms: *CROSSLO* takes a value of 1 for cross-listed firms that are predominantly traded on the TSX, and zero otherwise. *CROSSHI* takes a value of 1 for cross-listed firms that are predominantly traded on a U.S. stock exchange, and zero otherwise. Standard errors are shown in parentheses.

	(1)	(2)	(3)	(4)
	bm	bm	ep	ep
Log of size (US$ mm)	0.087***	0.109***	-0.006**	-0.002
	(0.013)	(0.013)	(0.003)	(0.003)
Return on equity	-0.281***		0.759***	
	(0.069)		(0.018)	
Profit margin		-0.001		0.001
		(0.001)		(0.001)
Asset turnover		-0.004		0.002
		(0.028)		(0.007)
Financial leverage		-0.021***		-0.001
		(0.004)		(0.001)
Cost of equity	0.216		0.074	
	(0.823)		(0.208)	
T-bill		1.081		0.379
		(1.779)		(0.556)
Firm-specific premium		0.141		-0.123
		(0.972)		(0.281)
Sales growth	-0.080***	-0.080***	-0.001	0.004
	(0.014)	(0.014)	(0.004)	(0.004)
Neg. earnings before extraordinary items	0.196***	0.294***	-0.052***	-0.294***
	(0.033)	(0.026)	(0.009)	(0.008)
Turnover mostly TSE	**-0.086***	**-0.101****	**-0.011**	**-0.008**
(*CROSSLO*)	**(0.044)**	**(0.045)**	**(0.010)**	**(0.012)**
Turnover mostly U.S.	**-0.214*****	**-0.232*****	**-0.013**	**-0.006**
(*CROSSHI*)	**(0.058)**	**(0.058)**	**(0.013)**	**(0.015)**
Financial services	-0.050	0.016	-0.028*	-0.004
	(0.098)	(0.101)	(0.016)	(0.018)
High-tech	-0.280***	-0.276***	-0.001	-0.011
	(0.077)	(0.078)	(0.013)	(0.014)
Transportation & Utilities	-0.201	-0.206	0.003	0.014
	(0.149)	(0.149)	(0.025)	(0.025)
Natural resources	-0.042	-0.048	-0.022*	-0.021
	(0.072)	(0.075)	(0.012)	(0.014)
Constant	0.697***	0.523**	0.023	0.049
	(0.146)	(0.234)	(0.035)	(0.070)
Year dummies	Yes	Yes	Yes	Yes
Observations	4186	4186	4186	4186
R-squared (overall)	0.067	0.067	0.486	0.300

* significant at 10 per cent; ** significant at 5 per cent; *** significant at 1 per cent

Table 9: Panel Regressions (Random Effects) Using Cross-Listed Canadian Firms and U.S. Firms, 1990–2001

This table reports panel regressions with random effects on book-to-market and earnings-to-price for a sample of U.S.-listed firms and cross-listed Canadian firms. Canadian firms listed exclusively on the TSX are excluded from this comparison. See Table 5 for a description of the regressions. Standard errors are shown in parentheses.

	(1)	(2)	(3)	(4)
	bm	bm	ep	ep
Log of size (US$ mm)	0.040***	0.045***	-0.003***	-0.001
	(0.003)	(0.003)	(0.001)	(0.001)
Return on equity	-0.115***		0.148***	
	(0.010)		(0.003)	
Profit margin		0.001*		-0.001
		(0.001)		(0.001)
Asset turnover		-0.032***		0.001
		(0.006)		(0.002)
Financial leverage		-0.012***		-0.002***
		(0.001)		(0.001)
Cost of equity	-0.951***		-0.151***	
	(0.158)		(0.046)	
T-bill		3.421*		-0.934
		(1.778)		(0.588)
Firm-specific premium		-0.976***		-0.226***
		(0.158)		(0.047)
Sales growth	-0.065***	-0.067***	0.012***	0.014***
	(0.006)	(0.006)	(0.002)	(0.002)
Neg. earnings before extraordinary items	0.210***	0.251***	-0.190***	-0.239***
	(0.007)	(0.007)	(0.002)	(0.002)
Cross-listed	**0.070***	**0.054**	**-0.001**	**-0.003**
	(0.041)	**(0.041)**	**(0.008)**	**(0.008)**
Financial services	0.044**	0.075***	0.005	0.016***
	(0.018)	(0.019)	(0.004)	(0.004)
High-tech	-0.163***	-0.178***	0.002	0.001
	(0.017)	(0.017)	(0.004)	(0.004)
Transportation & Utilities	-0.055*	-0.073**	0.014**	0.012*
	(0.032)	(0.032)	(0.006)	(0.006)
Natural resources	-0.050	-0.076**	0.003	0.002
	(0.031)	(0.031)	(0.006)	(0.006)
Constant	0.766***	0.487***	0.076***	0.153***
	(0.027)	(0.136)	(0.007)	(0.045)
Year dummies	Yes	Yes	Yes	Yes
Observations	38732	38732	38732	38732
R-squared (overall)	0.062	0.057	0.325	0.299

* significant at 10 per cent; ** significant at 5 per cent; *** significant at 1 per cent

Table 10: Panel Regressions (Random Effects) Using Cross-Listed Canadian Firms and U.S. Firms, 1990–2001

This table reports panel regressions with random effects on book-to-market and earnings-to-price for a sample of U.S.-listed firms and cross-listed Canadian firms. Canadian firms listed exclusively on the TSX are excluded from this comparison. See Table 5 for a description of the regressions. Two dummy variables are used to identify cross-listed firms: *CROSSLO* takes a value of 1 for cross-listed firms that are predominantly traded on the TSX, and zero otherwise. *CROSSHI* takes a value of 1 for cross-listed firms that are predominantly traded on a U.S. stock exchange, and zero otherwise. Standard errors are shown in parentheses.

	(1)	(2)	(3)	(4)
	bm	bm	ep	ep
Log of size (US$ mm)	0.040***	0.045***	-0.003***	-0.001
	(0.003)	(0.003)	(0.001)	(0.001)
Return on equity	-0.115***		0.148***	
	(0.010)		(0.003)	
Profit margin		0.001*		-0.001
		(0.001)		(0.001)
Asset turnover		-0.032***		0.001
		(0.006)		(0.002)
Financial leverage		-0.012***		-0.002***
		(0.001)		(0.001)
Cost of equity	-0.947***		-0.151***	
	(0.158)		(0.046)	
T-bill		3.080*		-0.937
		(1.780)		(0.588)
Firm-specific premium		-0.970***		-0.226***
		(0.158)		(0.047)
Sales growth	-0.065***	-0.067***	0.012***	0.014***
	(0.006)	(0.006)	(0.002)	(0.002)
Neg. earnings before extraordinary items	0.210***	0.251***	-0.190***	-0.239***
	(0.007)	(0.007)	(0.002)	(0.002)
Turnover mostly TSE	**0.129*** **	**0.113*** **	**0.001**	**-0.002**
(*CROSSLO*)	**(0.043)**	**(0.043)**	**(0.009)**	**(0.010)**
Turnover mostly U.S.	**-0.041**	**-0.054**	**-0.002**	**-0.004**
(*CROSSHI*)	**(0.050)**	**(0.050)**	**(0.012)**	**(0.012)**
Financial services	0.044**	0.075***	0.005	0.016***
	(0.018)	(0.019)	(0.004)	(0.004)
High-tech	-0.162***	-0.177***	0.002	0.001
	(0.017)	(0.017)	(0.004)	(0.004)
Transportation & Utilities	-0.055*	-0.074**	0.014**	0.012*
	(0.032)	(0.032)	(0.006)	(0.006)
Natural resources	-0.049	-0.075**	0.003	0.002
	(0.031)	(0.031)	(0.006)	(0.006)
Constant	0.766***	0.513***	0.076***	0.153***
	(0.027)	(0.136)	(0.007)	(0.045)
Year dummies	Yes	Yes	Yes	Yes
Observations	38732	38732	38732	38732
R-squared (overall)	0.062	0.058	0.325	0.299

* significant at 10 per cent; ** significant at 5 per cent; *** significant at 1 per cent

Appendix A: Variable Definitions

Asset turnover = total sales/total assets = DATA12/DATA6

Book-to-market = book value per share/price = [DATA60/(DATA25*DATA27)]/P

Cost of equity = treasury bill rate + ß * (return on market index – treasury bill rate)

Earnings-to-price = [earnings before extraordinary items per common share/cumulative adjustment factor]/ price per share = (DATA58/DATA27)/P. If DATA58 is not available, earnings-to-price is computed as earnings before extraordinary items [DATA18/(DATA25*DATA27)]/ P

Financial leverage = total assets/common equity = DATA6/DATA60

Price per share (P) = closing price at the end of the first quarter of each year (e.g., 31 March) (DATA14)

Profit margin = net income before extraordinary items/total sales = DATA18/DATA12

Return on equity (ROE) = net income before extraordinary items/common equity = DATA18/DATA60

Risk-adjusted stock market return = (total equity market return over past year – T-bill rate)/[standard deviation of (total equity market return over past year – T-bill rate)]

Sales growth = $(sales_{t-2}/sales_t)^{0.5} - 1$

Shares outstanding = number of shares outstanding at year end*cumulative adjustment factor = DATA25*DATA27

Bank of Canada Working Papers
Documents de travail de la Banque du Canada

Working papers are generally published in the language of the author, with an abstract in both official languages. ***Les documents de travail sont publiés généralement dans la langue utilisée par les auteurs; ils sont cependant précédés d'un résumé bilingue.***

2004

2004-16	The Effect of Economic News on Bond Market Liquidity	C. D'Souza and C. Gaa
2004-15	The Bank of Canada's Business Outlook Survey: An Assessment	M. Martin and C. Papile
2004-14	National Saving–Investment Dynamics and International Capital Mobility	F. Pelgrin and S. Schich
2004-13	Contraintes de liquidité et capital humain dans une petite économie ouverte	F. Pelgrin
2004-12	Durées d'utilisation des facteurs et fonction de production : une estimation par la méthode des moments généralisés en système	E. Heyer, F. Pelgrin, and A. Sylvain
2004-11	Estimating New Keynesian Phillips Curves Using Exact Methods	L. Khalaf and M. Kichian
2004-10	Public Venture Capital and Entrepreneurship	O. Secrieru and M. Vigneault
2004-9	Estimating Policy-Neutral Interest Rates for Canada Using a Dynamic Stochastic General-Equilibrium Framework	J.-P. Lam and G. Tkacz
2004-8	The Economic Theory of Retail Pricing: A Survey	O. Secrieru
2004-7	The Demand for Money in a Stochastic Environment	J. Atta-Mensah
2004-6	Bank Capital, Agency Costs, and Monetary Policy	C. Meh and K. Moran
2004-5	Structural Change and Forecasting Long-Run Energy Prices	J.-T. Bernard, L. Khalaf, and M. Kichian
2004-4	A Structural Small Open-Economy Model for Canada	S. Murchison, A. Rennison, and Z. Zhu
2004-3	Modélisation << PAC >> du secteur extérieur de l'économie américaine	M.-A. Gosselin and R. Lalonde
2004-2	Exact Tests of Equal Forecast Accuracy with an Application to the Term Structure of Interest Rates	R. Luger

Copies and a complete list of working papers are available from:
Pour obtenir des exemplaires et une liste complète des documents de travail, prière de s'adresser à :

Publications Distribution, Bank of Canada
234 Wellington Street, Ottawa, Ontario K1A 0G9
E-mail: publications@bankofcanada.ca
Web site: http://www.bankofcanada.ca

Diffusion des publications, Banque du Canada
234, rue Wellington, Ottawa (Ontario) K1A 0G9
Adresse électronique : publications@banqueducanada.ca
Site Web : http://www.banqueducanada.ca